The third Paper read was—

3. *Exploration of the Færöes and Iceland*, &c. By DR. JOHN RAE, F.R.G.S., commanding the Land Party.

THE FÆRÖE ISLES.

AFTER a passage of fourteen days from England in the screw yacht *Fox*, we arrived, on the 3rd August, at Thorshaven, the capital of the Færöes. It contains about 900 inhabitants.

On the day following Colonel Shaffner, Lieutenant Von Zeilau (Danish Commissioner), and myself, accompanied by two Færöese as guides, commenced a journey over Stromöe, our destination being Haldervig, a village near the northern extremity of that island. Our course for the first two miles was W.N.W., over the shoulder of a hill (named Klubbin), the height of which about 50 feet below its summit was 1048 feet; we then turned more to the northward until we reached the high land immediately south of Kalbakfiord, 1408 feet above the sea level. The walking round the head of this fiord was fatiguing in consequence of the unfinished state of the path. At the end of five hours we reached the top of the pass overlooking Kollefiord, having an altitude of 1179 feet. When we descended to the valley we took up our night's quarters at the house of Mr. Dam, a farmer, who gave us a hospitable welcome and provided us with a good dinner of fish, dried mutton, ham, cheese, butter, milk, cream, and coffee. Next morning I ascended a hill named Skarling, said to be the highest on Stromöe. Strong squalls of wind, with heavy rain changing into snow as we neared the summit, made the climbing difficult. The barometer indicated a height of 2506 feet. The Colonel had in the mean time travelled along the path a distance of 5 miles to the house of J. C. Jacobson, where we joined him. We were again hospitably entertained, and after remaining an hour we resumed our journey. Our active guides led us by the shortest but the most difficult of two routes, the highest point of which was 1711 feet above the sea. We arrived in the afternoon at Qualvig, a village having 132 inhabitants, where we passed the night. Next morning we traced back the more level but longer route between Qualvig and Kollefiord. We found its highest point to be 1275 feet at $2\frac{1}{4}$ miles' distance from Qualvig. The hill is not too steep for loaded ponies. We hired some of these excellent little animals for the purpose of testing their qualities. They were strong, sure footed, and carried with ease a man weighing over 15 stone. From Qualvig to Haldervig the distance is 9 miles, and the path lies close to the shore all the way. We found the *Fox* at Haldervig.

The formation of the island of Stromöe is almost wholly basaltic, with an occasional thin stratum of red tufa. Opals are found in the hills north of Kollefiord. No difficulties of importance present themselves to the placing of a telegraph line over the route examined, which is about 27 miles in length. At three points of the line some expense would necessarily be incurred in improving the paths, so as to make them more easy for loaded ponies to travel over. These places are the ascent of the high grounds north and south of Kalbakfiord, the descent to Kollefiord, and the height between Kollefiord and Qualvig.

The inhabitants generally appear to be well educated and religious, and so fully aware of the advantages they would derive from a telegraph being carried through their island, that they would use their best efforts to protect it from injury.

Labour is comparatively cheap, the average day's wages being about 1*s.* 4*d.* sterling. Our guides were well pleased to receive 2*s.* each per day.

The climate is not well suited for the growth of grain, but small quantities of barley and oats are raised, and a few potatoes, turnips, and other vegetables are cultivated. The live stock of the farmers are sheep, horned cattle, and ponies, sheep being the principal and most valuable productive source. The population of Stromöe is upwards of 2600. The chief exports are wool, woollen goods, eider-down, fish, ponies, and oil. The inland transport is principally by pack-horses.

Two small bays, the one a short distance to the south of Thorshaven, the other at Haldervig, having been examined by Captain Allen Young, were found well adapted for the landing of a telegraph cable; and the route examined by me overland forms the connection of the projected telegraph.

The sound separating Stromöe from Osteröe offers great facilities for the transport of materials, as it is navigable throughout the whole length, with the exception of about 100 yards near Qualvig, for vessels of ordinary size. The arms of this sound, namely, Kalbakfiord, Kollefiord, and Qualvig Bay, afford good anchorages and approach at three points to within a quarter of a mile of the projected route.

ICELAND.

The *Fox* reached Berufiord, on the east coast of Iceland, on the afternoon of the 12th, and anchored in the harbour of Djupivogr, near the entrance of the fiord. From this place the land expedition resumed its labours to travel across the island to Reikiavik. About fourteen horses, and two men to act as guides and pony-drivers,

were required. We had two very zealous auxiliaries in the persons of Mr. Weywadt, the Danish merchant, and Lieutenant Von Zeilau, both of whom exerted themselves to procure the necessary assistance and accommodations for the journey. Only eight ponies, exclusive of those of the guides, could be obtained at prices varying from 2*l.* 12*s.* to 5*l.* 10*s.* Hoping to complete our number of ponies on the way, we left Djupivogr on the afternoon of the 15th. With the exception of the guides, our party was the same as that when travelling across Stromöe. Our path ran along the south shore of Berufiord, and was rough and stony. It was getting late when we reached the head of the fiord, a distance of only $9\frac{1}{2}$ miles in a straight line; so we proceeded to the pastor's house, which we made our home for the night. This worthy man, Sira Hosias, who had been to Djupivogr, overtook us as we were dismounting at his door, and gave us a hearty welcome.

It was difficult to make an early morning's start. Our horse-drivers were active and willing enough, yet we could seldom get away before eight or nine o'clock. A lamb was bought for 2*s.* 3*d.* sterling. After taking an observation with the barometer we resumed our journey, and ascended to the tableland west of Berufiord by a series of four steps. The path, which is formed among stones, gravel, and earth, might be much improved by a very little labour. Two observations for altitude were obtained: the first about halfway up, giving 891 feet; the last near the top, 1282 feet, at which the latitude 64° 49′ 3″ N. was also observed.

From this point our path lay nearly due north for 8 miles to a small lake, 426 feet above the sea level. After travelling 7 miles farther in the same direction we arrived at Thingmuli, and took up our quarters in the church, where we found ourselves very comfortable. The clergyman, Sira Biarni, was a kind and good man. A strong horse suitable for either pack or riding was bought here for 3*l.* 8*s.*

Our course for 5 miles was north, along the slope of a hill. We then travelled west until crossing the ridge, when we turned to the south-west, and reached in a short time Hallormstadr, on the banks of Lagar Fliot. Hitherto we had been surrounded by a dense fog, which we emerged from on descending the hill. We here allowed our horses to feed for an hour, and an observation with the barometer gave the altitude of our position 528 feet; that of the river, which was upwards of a quarter of a mile distant, being 90 feet lower. This river has its source in the Vatna Jökul, and the muddy and white colour of its water indicates its glacier origin. As far as we could see to the northward the river widens into the form of a narrow lake

having little or no current. This was the case we were told for 30 miles or more. As we rode to the southward along the stream we passed through a grove of small birch trees, many of which were from 16 to 18 feet in height. At 4 miles above Hallormstadr the lake-like river ends, and 4 miles farther up we came to the ferry. The river was here about 170 yards wide, the current strong, and the water so deep from the recent rains that the horses had to swim when crossing. The ferry-boat carried us all over with the baggage at two trips. We walked to the parsonage of Valthiofstadr, 2 miles distant, and met with a most kind reception from Sira Pietra. Taking the direct route to Valthiofstadr, it may be reached in one day from Berufiord, as the distance is about 26 geographical miles, and we learned that the road was not bad.

The morning of the 18th was very beautiful. Our horses having strayed during the night, we were detained some hours. We here bought another horse for 2*l.* 14*s.* After riding 8 miles along a fine level path, we turned to the north-west and commenced the ascent of a steep hill, up which we had not gone half way before we were in a thick fog. Fortunately we had engaged a guide, otherwise it would have been difficult to have kept the proper track. It was half-past nine and very dark when we arrived opposite to Bru, where we had to cross a river on one of those curious swing-bridges before reaching the house. This conveyance was about 2 feet 6 inches long, 2 feet wide, and 2 feet deep, suspended by pulleys to two ropes, which stretch over the river at a height of 30 feet above the stream, which is about 70 feet wide.

Our day's ride had been long and fatiguing, but there were only two parts of the road by any means difficult: the first being the ascent of the hill in the early part of the day already mentioned, and the other where we descended to a small stream, about 7 miles distant from Bru. In both instances the ground is of such a nature that the paths are capable of easy improvement. The heavy rains had made a portion of the road rather swampy.

Sunday, 19*th*.—Taking with us a guide, we started for Mödrudalr. For 12 miles our course was north; we then turned to the westward, which we kept all the way to Mödrudalr, where we arrived at half-past six. The roads were good throughout the day's journey, and we passed great quantities of dwarf willow; at 8 miles from Mödrudalr we traversed a perfectly desert plain, flat as a bowling-green, and covered with black sand and gravel, the débris of lava. Sigurder Jonsson, the owner of the comfortable farm-house, gave us a most hearty welcome. The farm is extensive, and produces an excellent crop of grass and quantities of dwarf willow, which, when

cut and dried, furnishes excellent fodder for both sheep and cattle. Mr. Jonsson possesses 600 of the former, three or four of the latter, and a number of horses.

Mödrudalr is situated in a beautiful plain, extending to a long distance north and south. Far to the south, at least 45 miles off, you see one of the peaks of Vatna Jökul, having a deep snow-filled cleft in the centre. Within 15 miles to the south-west is Herdubreid, one of the highest mountains in Iceland.

20*th*.—In company with a Mr. Skulason, who was going in the same direction as ourselves, we left Mödrudalr at nine A.M. Our course during the whole day's travel was north, with a very little westing. The road was good, and we arrived at Grimstadr, 25 miles distant, at half-past two P.M.

21*st*.—Mr. Skulason still gave us the advantage of his company. We arrived at the ferry on the Jökulsa Axarfiordr at 9·15 A.M., which is 4 miles from Grimstadr. The river is 150 yards wide, the water deep, and the current very strong. The horses had to swim about half the way. We crossed in a boat. The banks of the river are of fine black sand. The water was white and muddy, bearing the characteristics of a river that has its source from a jökul, or glacier. Its west bank is 951 feet above the sea-level. When we had ridden 16 miles from the river we arrived at an immense bed of very rugged lava in a valley to our left, and in one place there was an appearance as if it had filled up the bed of a river. We rode for 7 miles along this lava and then turned aside to visit a number of boiling mud-springs.

Before reaching Reikialith we had ridden among or close to the most recent lava we had seen. The only object I could compare the rough lava beds to, except in colour, was a field of ice that had been floated at high water to a low flat beach, covered with large boulder rocks, which, when the tide ebbed, broke up the ice into all sorts of forms. Reikialith is situated on the shores of Myvatn (Lake), which is very irregular in form and studded with rugged lava islands. Our course to-day was nearly west, and the distance travelled fully 30 miles.

22*nd*.—The first portion of the route was crooked, to avoid holes in the lava which were overgrown with moss and grass. A ride of six and a half hours, including an hour of stoppage to graze horses, brought us to the ford of Arndisarstadr, on the Skialfandafliot. It was about 100 yards wide, 2 feet deep, the current strong, and the water white and muddy. We reached the house of the worthy pastor (Sira Pallson) at Hals in the evening.

Hals is in lat. 65° 44′ N., and was the farthest north point reached

by us. I learned that, during the winter, snow occasionally falls to great depth, and is blown into deep drifts. The cold is not usually severe, the lowest temperature being 20° or 21° below zero o Reaumur, equal to 13° or 15° below zero of Fahrenheit, and this occurs but rarely.

Thursday, 23*rd*.—We resumed our journey, having with us Mr. Eggerd Olafsson, a young student, who most obligingly offered his services as guide. After travelling south 2 miles along the small river that flows northward past Hals, we forded the stream. We crossed to the west the ridge of hills, about 1900 feet high, that lies between Hals and Akreyri. This last-named place is next in size to Reikiavik. As soon as we appeared from under the fog on the hill side, the twelve vessels at anchor in the harbour hoisted their colours. Akreyri is built at the head and on the west shore of Eyjafiord. Its harbour is sheltered by a spit of land that runs half way across the fiord where its width is about a mile. From the beginning of November to the end of March or April the navigation is usually closed by ice; but during the summer months there is considerable trade at this place. The valley is one extensive and productive grass meadow running southward for nearly 30 miles, on which a great number of persons were occupied haymaking. The river I found to be navigable for boats drawing about 2 feet of water, to the distance of 25 or 30 miles: its width varies from 25 to 80 yards. The path was good and level, fitted for a waggon in summer or for a sledge in winter.

Early in the evening we came to Saurbær, and were most cordially welcomed by Sira Thorlacius, a clergyman distinguished for his goodness and learning. We here made our arrangements for the next three days' journey, which lay through an uninhabited part of the country. The guide lived at some distance, and our young student rode to his house and engaged him.

24*th*.—From Holar the path led us south for four miles along the east bank of the stream; we then commenced an ascent of the high grounds in a south-west direction. The hill was 2868 feet in height, being the greatest altitude we had yet passed over. We reached the top in an hour and a half: although the road was now pretty level and many of the larger stones had been removed to one side, the path was not good enough to permit us to ride fast.

We made many détours so as to avoid the rougher portions of the ground, but the general direction of our travel was to w.s.w. In the evening a thick fog came on, and as the cairns of stone set up as marks became less frequent, the guide lost his way, and I had to put him right by the compass. About half-past eight we pitched

our tent on the bank of a small stream, where there was a little grass for our tired horses. Generally speaking, when travelling over Iceland, sufficient dry willows and willow-roots can be picked up for cooking; but here none could be found, so we had recourse to an "Etna" and some alcohol we had carried with us for the preparation of our coffee.

25*th*.—Our position by computation was in latitude 65° 8′ N., longitude 18° 53′ W.; height by observation above sea, 2385 feet. The fog still continued this morning, but not very thick. We had to put back a short distance to recover the proper route; we then crossed a small white water stream, very rapid and stony, named Jökulsa Eystri. Our course was generally south-west by west, marked by little heaps of stones. As usual, we stopped twice to-day to grass the horses near some lakes, where several swans were seen. We should have made a long journey to-day, but fog again came on in the evening, notwithstanding which our guide insisted that he could find the way. His confidence in himself was misplaced.

Two observations for height were obtained to-day: one at Pollar, latitude 65° 5′ N., 19° 2′ W., gave altitude 2368 feet; the other, 6 miles south-west of Pollar, 2463 feet. Both these places afford good grass and water for horses. In latitude 64° 45′ we crossed nearly two miles of very rough lava, extremely difficult to travel over. A small amount of labour would remedy this evil. Farther on we passed quagmires of very adhesive clay. These by a little care can be easily avoided.

Between the latitudes of 65° and 64° 45′ N., and in longitude 19° 20′ W., we crossed a number of rivers, very rapid and some of them 2 feet deep, flowing from Hofsjökul, which lay to our left. Many of these streams appear to change their beds or to spread out to considerable extent during thaws or rainy weather, and could be crossed with difficulty by a telegraph wire, were it not that I noticed at some points the water was kept within bounds on both sides by solid barriers of rock or lava, generally not more than 20 yards apart.

26*th*.—Our position by account was in latitude 64° 40′ N., longitude 19° 33′ W., and height above sea 1983 feet. It was ten o'clock before we got away. Our road was better than for the past two days, and we went ahead faster. About half-past three P.M. we arrived at the Hvita River, a mile or two below its source from Hvitarvatn, having come 22 miles down hill, the incline being very gradual. The altitude here was 1580 feet.

The river, which is 120 yards wide, could be forded by the horses, but they were very nearly swimming; so, to save our baggage from

getting wet, we had a boat brought across and were ferried over. After permitting the horses to feed for an hour and a half, we travelled westward for five miles round the base of the craggy and lofty Blafell. We now passed over a ridge 400 feet higher than the ferry on the Hvita.

From this point we had a very extensive view of more than fifty miles down the valley of the Hvita, with its numerous lakes and boiling springs—the clouds of white vapour from the latter indicating their positions. We now made a south course, and at the end of seven miles again came to the banks of the Hvita, along which we found an excellent path, over which we trotted at a great rate until late, when the guide again lost his way and left us at a good grazing place to search for a house in the neighbourhood.

27*th*.—After waiting until half-past eleven in vain for the return of our truant guide, we unpacked our tent and lay under it, having no poles to pitch it with. The guide joined us at five in the morning. He said he had wandered about all night in search of his friend's house, which was within less than ten minutes' ride of where we were. We reached Haukadalr at a little before six and took up our quarters in the church, where we had a good and substantial breakfast.

We then rode forward to the Geysers, where we found Lord Milton encamped. We collected specimens and sounded a Geyser, obtaining 78 feet depth. The barometer gave the height of the position 626 feet above the sea in latitude by observation 64° 18′ 16″ N.

Our breakfast at Haukadalr had not been so superior as to prevent us enjoying the good things that Lord Milton most kindly invited us to join him in partaking of, and after a parting glass of champagne with his Lordship we rode for sixteen miles farther on our way to Reikiavik, and then took up our night's quarters at Laugarvatn. Near this house are several boiling springs of very pure water, which are used for cooking.

We arrived at Reikiavik at eight o'clock on the morning of the 29th August, all well, but our horses very much used up by a journey of nearly 450 statute miles.

The results of this journey went to prove that there would be no serious difficulty in carrying a telegraph across Iceland by the route travelled over. Doubtless considerable expense would be incurred in repairing the old paths so as to make them more easy for loaded pack-horses, and in making new ones to shorten distances; but this work will be materially facilitated, as the Icelandic Diet has appropriated a considerable amount of money to be paid annually for this purpose. The six largest rivers that we crossed had high well-

defined banks, that showed no indication of ice action or of changing their position.

A shorter and in every respect a better route across Iceland for telegraphic purposes than the one described is that marked on the chart in a dotted line. This route, from Berufiord as far as Möd-rudalr, in latitude 65° 17′ N., longitude 16° W., is nearly the same as that followed by us. From this point, instead of running northward, it strikes nearly west for 45 miles over what is said to be not a difficult country, to Isholl, a farm on the Skialfanda river. Following up the west bank of this stream to near its source, you cross the centre of Iceland in a south-westerly direction, by the Sprengisandr road, until you fall upon the head waters of the Thorsa. Trace this stream to south-west, keeping on its left bank to avoid the numerous jökul streams that enter it on the right, until reaching latitude 64° 20′, where the river would be crossed. The course then would be west to the Hvita and the Geysers. On nearly fifty miles of this route there is little or no grass, but depôts of hay can be established. Having measured on the charts four different routes from Berufiord to Reikiavik, the distances are about as follows:—

	Geographical Miles.
Route travelled over, cutting off several unnecessary détours ..	310
By contemplated telegraph route, *viâ* Sprengisandr	250
In a straight line, keeping north of Vatna Jökul	210
Along south shore of Iceland	260

The modes of transport through Iceland are by pack-horses, waggons, and in winter on sledges. Of these the pack-horse is by far the most general. These little animals are remarkably sure-footed, and so strong that they can carry a load of 200 or 250 lbs. with apparent ease. They are easily kept in condition with no other food than grass or hay. Their prices vary from 2*l.* to 3*l.*, those for riding being more expensive. The pack-saddle in general use is an extremely primitive affair, the pads employed to protect the back from being injured being composed of turf which has been well dried, and a portion of the mould beat out of it. Boats might be used with advantage on some of the rivers.

The population of Iceland amounts at present to some 60,000; at one time it is said to have been as high as 100,000, but the ravages of epidemic diseases and other causes reduced the numbers to less than those at present on the island.

The masses of the people are able and active, harmless and honest. Wherever we went we were received with much kindness and hospitality, and even at the poorest cottages milk, coffee, and brandy were handed to us. All classes seem more or less educated, and

the Lutheran religion prevails. The chief occupations of the people are fishing and farming, both being combined when the farms are near the sea. The women spin, knit woollens, and weave cloth for home consumption. The farm live stock consists of sheep, ponies, and horned cattle; the two last are of small size. Of these, the sheep are the chief source of wealth. A farmer having 800 or 1000 sheep is considered wealthy. The usual food is mutton, fish (fresh and dried), rye-bread, butter, cheese, milk, one preparation of which, named *skuer*, is much used.

The price of labour varies from 1*s.* 2*d.* to 2*s.* 8*d.* per day, according to the season. During the haymaking, in the months of July, August, and September, it is highest.

Reikiavik, the capital of Iceland (a town of 1500 inhabitants), has been so often described by others, that it is needless for me to say anything on the subject. A little thin ice forms along shore near Reikiavik during calm weather in the winter time, but the first breeze of wind disperses it.

GREENLAND.

The *Fox* sailed from Reikiavik on the 31st August for Greenland. On the 2nd of October we reached Fredrikshaab. There are a Danish superintendent, a clergyman, and several clerks at this place, and about 200 Esquimaux. These Esquimaux are civilized; sober, honest, and faithful, apt and willing to be instructed—attentive to their religious observances, and thankful for kindness. The evening amusement was dancing. The principal food of the natives is fish, seal, whale, a few ptarmigan, waterfowl, including eider duck, with biscuit and coffee, imported from Denmark. Large quantities of a small fish (the kepling), called by the Esquimaux "amaset," are caught in scoop nets in the summer and dried on the rocks. These are laid up for winter food and sometimes given to the cattle. After lying here eighteen days the *Fox* sailed on the 20th of October for Julianshaab, at which place she anchored on the evening of the 22nd. Julianshaab is one of the principal stations on the coast.

On the 24th I learned that it had been decided to sound and examine the Fiord of Igalikko, which ran by Julianshaab. During the time that the *Fox* would be employed on this service, which I was told by Captain Young might probably occupy four days, I thought with Colonel Shaffner that a short journey should be made to the interior of the country, for the purpose of ascertaining the practicability of travelling over it. The use of one seaman and a whale-boat was obtained from Captain Young to enable us to return from the head of the fiord to Julianshaab. Four Esquimaux women were engaged

as rowers. At 16 miles inland from the fiord a heavy fall of snow stopped farther travel. After an absence of four days we returned to our boat, but found that the fall of snow, followed by unusually cold weather, had already caused the fiord to freeze up for many miles. We had enough of provisions, and were supplied with some excellent fresh mutton, milk, and butter by an Esquimaux that lived in the neighbourhood, to whose house we removed. The frost continued for several days with unusual severity, and made the ice strong enough to enable Captain Young (after coming half way up the fiord in a boat) to travel over the ice with a sledge party from the *Fox* to our relief. Another party of men, sent by Superintendent Möller from Julianshaab to aid us, arrived at the same time. We all returned next day (the 6th) to the *Fox*.

At Julianshaab, as at Fredrikshaab, nothing could exceed the kindness and hospitality of the resident Danish gentlemen. Mr. Möller, the superintendent, Mr. Höyer, his assistant, the doctor, and others vied with each other in paying us attention.

The chief exports of the place are whale and seal oil, fox skins (blue and white), bear skins, and eider down. A few cattle, goats, and sheep are kept. The hay is usually collected at the summer encamping places of the natives, and must be very nutritious, as I was informed that one small cow during the past summer had not only yielded sufficient milk and cream to supply the family, but also to make eighty Danish pounds of butter. The natives here, as at Fredrikshaab, are honest, docile, and well conducted, doing great credit to the Danish government. The prevailing form of worship is the Lutheran.

The result of this expedition, as far as regards the land portion of it over the Færöe Isles and Iceland, was extremely favourable to the practicability of laying down or erecting a telegraphic wire. The question in Iceland will be, whether the telegraph should be carried across the whole island from Beru Fiord to Faxe Bay, or only from Portland Bay to the latter place. The latter will reduce the distance on land from about 250 to 90 miles.

The fourth Paper read was—

4. *Fiords of South Greenland.* By J. W. TAYLER, Esq.

THE land of Greenland is very elevated, the average height of its mountains being not less, perhaps, than 1500 feet, and in some places exceeding 6000 feet, above the level of the sea. It appears that at the time of the elevation of the west coast of Greenland, a chain of mountains of about 50 miles in breadth, running about